Operating Instruction Manual

Generic Slave DTM for AS-Interface Slave Devices

Configuration of AS-Interface Slave Devices

Hilscher Gesellschaft für Systemautomation mbH

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DOC090604OI05EN | Revision 5 | English | 2013-09 | Released | Public

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1 Introduction

1.1 About this Manual

This manual provides information on how to set up AS-Interface Slave devices described with EDS files. These devices can be configured with the AS-Interface generic Slave DTM within an FDT Framework.

Dialog Panes

The table below gives an overview for the individual dialog panes descriptions:

Section	Subsection	Manual Page
Configuration	*General*	19
	Configuration	20
	Signal Configuration	23
Device Description	*Device Info*	24
Diagnosis	*General* Diagnosis	27

Table 1 Descriptions Dialog Panes

1.1.1 Online Help

The generic AS-Interface Slave DTM contains an integrated online help facility.

- To open the online help, click on **Help** or press **F1**.

1.1.2 List of Revisions

Index	Date	Version	Component	Chapter	Revision
5	13-08-14	1.0002.x.x 1.0002.x.x	AS-iSlaveDTM.dll, AS-iSlaveGUI.ocx	All, 1.3.1	Revised, Section *Requirements*, Windows 8 added.

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1.1.3 Conventions in this Manual

Notes, operation instructions and results of operation steps are marked as follows:

Notes

Important: <important note>

Note: <note>

<note, where to find further information>

Operation Instructions

1. <instruction>
2. <instruction>

or

➢ <instruction>

Results

⇨ <result>

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1.2 Legal Notes

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1.3 About Generic AS-Interface Slave DTM

You can use the AS-Interface generic Slave DTM to configure the AS-Interface Slave devices described with EDS files within a FDT Framework.

The information necessary for the configuration of the AS-Interface Slave devices is stored within the AS-Interface Master device when using the AS-Interface generic Slave DTM and thus the Master device is configured.

1.3.1 Requirements

System Requirements

- PC with 1 GHz processor or higher
- Windows® XP SP3, Windows® Vista (32 bit) SP2, Windows® 7 (32 bit) SP1, Windows® 7 (64 bit) SP1, Windows® 8 (32 bit) or Windows® 8 (64 bit)
- Administrator privilege required for installation
- Internet Explorer 5.5 or higher
- RAM: min. 512 MByte, recommended 1024 MByte
- Graphic resolution: min. 1024 x 768 pixel
- Keyboard and Mouse

Note: If the project file is saved and opened again or if it is used on another PC, the system requirements must match. Particularly the DTM must be installed on the used PC.

Restriction

Touch screen is not supported.

Requirements AS-Interface Generic Slave DTM

Requirements for working with the AS-Interface generic Slave DTM are:

- Installed FDT/DTM V 1.2 compliant frame application
- Installed AS-Interface Master DTM
- EDS file of the devices to be configured
- The user needs to reload the Device Catalog

Loading EDS files

To add devices to the **netDevice** device catalog, you must import the EDS file of the used device via **netDevice** menu **Network > Import Device Descriptions ….** into the EDS folder of the DTM. Then the Device Cataloge must be reloaded. The folder EDS inclusively Windows® XP is located in the application data directory (All Users) of the configuration software (or from with Windows® 7 on in the *C:\ProgramData\ SYCONnet* directory).

For further information refer to section *Configuration Steps* on page 16 , under step 1 and 2.

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1.3.2 AS-Interface Slave Profiles

Each EDS file corresponds to a Slave profile (specified by the AS-i Protocol specification).

The following table shows the available Slave profiles defined each in an EDS file.

Available AS-Interface Slave Profiles: Device Name from the EDS File	
S-0.0, Remote I/O Port	S-7.4, Interface for 16-bit Signals
S-0.1, Two Dual-Signal Sensor	S-7.5, Combi field device
S-0.A, Extended Addressing Mode	S-7.A, Extended Addressing Mode
S-0.B, Safety Slave	S-7.B, Safety Slave
S-0.F, No Profile	S-7.D, Motor Control Device (electromechanical)
S-1.0, Remote I/O Port	S-7.E, Motor Control Device (semiconductor)
S-1.1, Single Sensor (ext. control.)	S-7.F, No Profile
S-1.A, Extended Addressing Mode	S-8.0, Remote I/O Port
S-1.F, No Profile	S-8.1, Two Dual-Signals Actuator
S-2.0, Remote I/O Port	S-8.A, Extended Addressing Mode
S-2.F, No Profile	S-8.F, No Profile
S-3.0, Remote I/O Port	S-9.A, Extended Addressing Mode
S-3.1, One dual sensor, one dual actuator	S-9.F, No Profile
S-3.A, Extended Addressing Mode	S-A.0, Remote I/O Port
S-3.F, No Profile	S-A.F, No Profile
S-4.0, Remote I/O Port	S-B.1, Dual Actuator with Feedback
S-4.A, Extended Addressing Mode	S-B.A, Extended Addressing Mode
S-4.F, No Profile	S-B.F, No Profile
S-5.0, Remote I/O Port	S-C.0, Remote I/O Port
S-5.A, Extended Addressing Mode	S-C.A, Extended Addressing Mode
S-5.F, No Profile	S-C.F, No Profile
S-6.0, Remote I/O Port	S-D.1, Single Actuator with Monitoring
S-6.A, Extended Addressing Mode	S-D.A, Extended Addressing Mode
S-6.F, No Profile	S-D.F, No Profile
S-7.0, Remote I/O Port	S-E.0, Remote I/O Port
S-7.1, Interface for 6-18-bit Signals	S-E.A, Extended Addressing Mode
S-7.2, Interface for 6-21-bit Signals	S-E.F, No Profile
S-7.3, Interface for 16-bit Signals	

Table 2: Available AS Interface Slave Profiles

The Slave profile notation for the example profile 7.A.8 is:

- I/O Configuration code = 7
- ID Code = A
- Ext. ID2 code = 8

For further information to the Slave profiles refer to section *I/O Code, ID Code, ID2 Code and Slave Profiles* on page 29, *I/O Data Size depending by IO and ID Code* on page 31 and to [3].

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1.4 Dialog Structure of the Generic AS-Interface Slave DTM

The graphical user interface of the DTM is composed of different areas and elements listed hereafter:

1. A header area containing the **General Device Information**,
2. The **Navigation Area** (area on the left side),
3. The **Dialog Pane** (main area on the right side),
4. **OK**, **Cancel**, **Apply**, **Help**,
5. The **Status Line** containing information e. g. the online-state of the DTM.

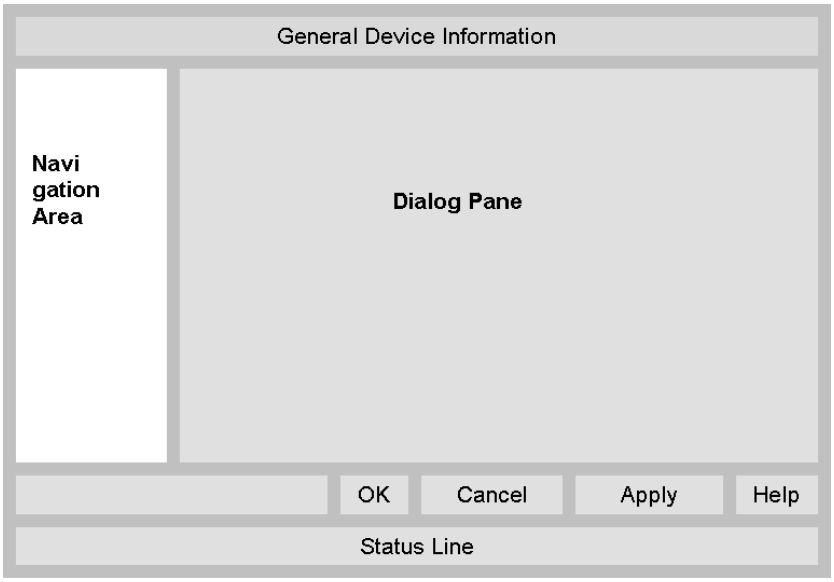

Figure 1: Dialog Structure of the Generic AS-Interface Slave DTM

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1.4.1 General Device Information

Parameter	Meaning
IO Device	Name of the device
Vendor	Vendor name of the device
Device ID	Identification number of the device
Vendor ID	Identification number of the vendor

Table 3: General Device Information

1.4.2 Navigation Area

The **Navigation Area** contains folders and subfolders to open the dialog panes of the DTM.

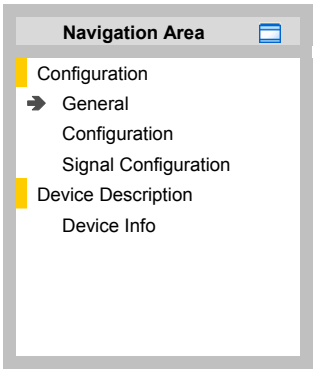

Figure 2: Navigation Area

➢ Select the required folder and subfolder.

➢ The corresponding Dialog pane is displayed.

Hide / display Navigation

	Hiding the navigation area (above right side).
Show navigation area	**Opening** the navigation area (below left side).

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1.4.3 Dialog Panes

At the dialog pane the **Settings**, **Device Description** or **Diagnosis** (depending by Slave) panes are opened via the corresponding folder in the navigation area.

Configuration	
General	At the pane General the symbolic name of the generic AS-Interface Slave device station can be set. Further information to this you find in section *General* on page *19*.
Configuration	At the pane Configuration the slave data and the parameter data of the generic AS-Interface Slave device station can be set. Further information to this you find in section *Configuration* on page *20*
Signal Configuration	At the pane Signal Configuration for the single signals respectively the names of the tags are set or the data types configured. Further information to this you find in section *Signal Configuration* on page *23*
Device Description	
Device	The Device Info pane contains the manufacturer information about the device. Further information to this you find in section *Device Info* on page *24.*
Diagnosis	
Diagnosis (depending by Slave)	At the Diagnosis panes diagnosis information can be read. For further information, refer to section *Overview Diagnosis* on page 26.

Table 4: Overview Dialog Panes

Note: To get access to the **Diagnosis** panes of the Generic AS-Interface Slave DTM requires an online connection from the AS-Interface Slave DTM to the AS-Interface Master DTM.

For further information, refer to section *Connecting/Disconnecting Device* on page 25.

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1.4.4 OK, Cancel, Apply and Help

OK, **Cancel**, **Apply** and **Help** you can use as described hereafter.

	Meaning
OK	To confirm your latest settings, click **OK**. All changed values will be applied on the frame application database. *The dialog then closes.*
Cancel	To cancel your latest changes, click **Cancel**. Answer to the safety query **Configuration data has been changed. Do you want to save the data?** by **Yes**, **No** or **Cancel**. **Yes**: The changes are saved or the changed values are applied on the frame application database. *The dialog then closes.* **No**: The changes are not saved or the changed values are not applied on the frame application database. *The dialog then closes.* **Cancel**: *Back to the DTM.*
Apply	To confirm your latest settings, click **Apply**. All changed values will be applied on the frame application database. *The dialog remains opened.*
Help	To open the DTM online help, click **Help**.

Table 5: OK, Cancel, Apply and Help

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1.4.5 Status Bar

The **Status Bar** displays information about the current state of the DTM. The current activity, e.g. the DTM connection state, is signaled graphically via icons in the status bar.

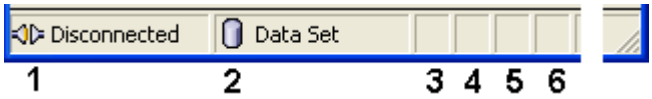
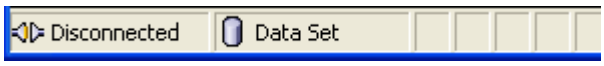


Figure 3: Status Bar – Status Fields 1 to 6

Status Field	Icon / Meaning	
1	**DTM Connection States**	
		Connected: Icon closed = Device is online
		Disconnected: Icon opened = Device is offline
2	**Data Source States**	
		Data set: The displayed data are read out from the instance data set (database).
		Device: The displayed data are read out from the device.
3	**States of the instance Date Set**	
		Valid Modified: Parameter is changed (not equal to data source).

Table 6: Status Bar Icons [1]

Offline State



Online State

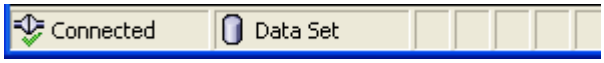


Figure 4: Status Bar Display Example

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2 Getting started

2.1 Configuration Steps

The following overview describes the steps to configure a AS-Interface Slave device with the AS-Interface generic Slave DTM as it is typical for many cases. At this time it is presupposed that the AS-Interface Master DTM installation was already done.

The overview lists all the steps in a compressed form. For detailed descriptions of each step refer to the sections noted in the column *For detailed information see section*.

#	Step	Short Description	For detailed information see section	Page
1	Add AS-Interface Slave in the Device Catalog	Add the Slave in the Device Catalog by importing the device description file to the Device Catalog. Depending of the FDT Container. For netDevice: - **Network > Import Device Descriptions**.	*(See Operating Instruction Manual netDevice and netProject)*	-
2	Load device catalog	Depending of the FDT Container. For netDevice: - select **Network > Device Catalog**, - select button **Reload Catalog**.	*(See Operating Instruction Manual netDevice and netProject)*	-
3	Create new project / Open existing project	Depending of the frame application. For the configuration software: - select **File > New** or **File > Open**.	*(See Operating Instruction Manual of the Frame Application)*	-
4	Insert Master or Slave into configuration	Depending of the FDT Container. For netDevice: - in the Device Catalog click to the Master, - and insert the device via drag and drop **to the line** in the network view, - in the Device Catalog click to the Slave, - and insert the device via drag and drop **to the Master bus line** in the network view.	-	-
5	Configure Slave	Configure the Slave device. - Double click to the device icon of the Slave. - The Slave DTM configuration dialog is displayed. In the Slave DTM configuration dialog: - select **Configuration > General**, - set the symbolic name of the generic AS-Interface Slave device station, - select **Configuration > Configuration**, - set the Slave data and the parameter data, - select **Configuration > Signal Configuration**, - set for the single signals the names of the tags or the data types, - close the Slave DTM configuration dialog via the button **OK**.	*Configuring Slave Parameter* *General* *Configuration* *Signal Configuration*	*18* *19* *20* *23*
6	Configuration Steps Master device	Configure the Master device via AS-Interface Master DTM.	*(See Operating Instruction Manual DTM for AS-Interface Master devices)*	-
7	Save project	Depending of the frame application. For the configuration software: - select **File > Save**.	*(See Operating Instruction Manual of the Frame Application)*	-

Table 7: Getting started - Configuration Steps

For information to further steps as **Diagnosis**, refer to the user manual *DTM for AS-Interface Master devices*.

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3 Configuration

3.1 Overview Configuration

Dialog Panes "Configuration"

The table below gives an overview about the available **Configuration** dialog panes descriptions:

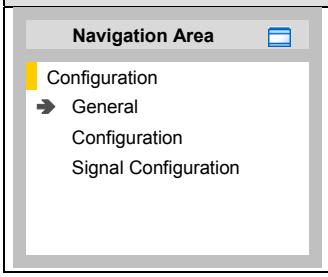
Generic AS-Interface Slave DTM	*General*	*19*
	*Configuration*	*20*
	Signal Configuration	*23*

Table 8: Descriptions of the Dialog Panes Dialog Panes Configuration

Notice the descriptions in the section *Configuration Steps* on page 16.

Note: Access to the configuration panes is enabled without requirement of user rights. However for editing certain user rights are required. Further information can be found in section and *User Rights* on page 28.

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3.2 Configuring Slave Parameters

The following steps are needed to set the Slave device parameters using the AS-Interface Slave DTM:

General

1. Enter the symbolic name of the generic AS-Interface Slave device station:

➢ Select **Configuration > General** in the navigation area.

Configuration

2. Set the slave data and the parameter data of the generic AS-Interface Slave device station:

➢ Select **Configuration > Configuration** in the navigation area.

Signal Configuration

3. For the single signals configure respectively the names of the tags or the data types:

➢ Select **Configuration > Signal Configuration** in the navigation area.

Close Generic Slave DTM Configuration Dialog

4. Click **OK** in order to close the Generic Slave configuration dialog and to store your configuration.

Further Information

For more information refer to section *General* on page *19*, to section *Configuration* on page *20* or to section *Signal Configuration* on page *23* .

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3.3 General

At the pane **General** the symbolic name of the generic AS-Interface Slave device station can be set.

Therefore proceed as follows:

1. Select **Configuration > General** in the navigation area.

➪ The dialog pane **General** is displayed.

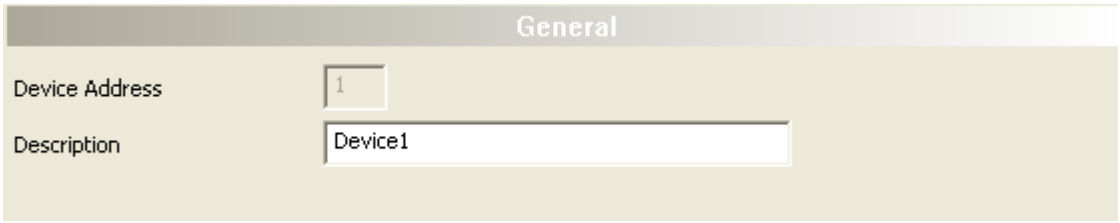

Figure 5: Configuration > General

Parameter	Meaning
Device Address	The device address of the generic AS-Interface Slave device station is set in the AS-Interface Master DTM. Here it is only displayed. The AS-Interface Master device transmits the device address of the generic AS-Interface Slave device during startup via the AS-Interface network to the generic AS-Interface Slave device and thereby configures the generic AS-Interface Slave device.
Description	Description of the generic AS-Interface Slave device station.

Table 9: Explanations to the Dialog Pane General

2. Under **Description** enter the description of the generic AS-Interface Slave device station.

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3.4 Configuration

At the pane **Configuration** the **Slave Data** and the **Parameter Data** of the generic AS-Interface Slave device station can be set.

The **Slave** and **Parameter Data** viewed or changeable in the **Configuration** pane corresponds to the used “Slave profile” described in the EDS file as defined by the specification of the AS-Interface protocol [3].

Proceed as follows:

1. Select **Configuration > Configuration** in the navigation area.

➪ The dialog pane **Configuration** is displayed.

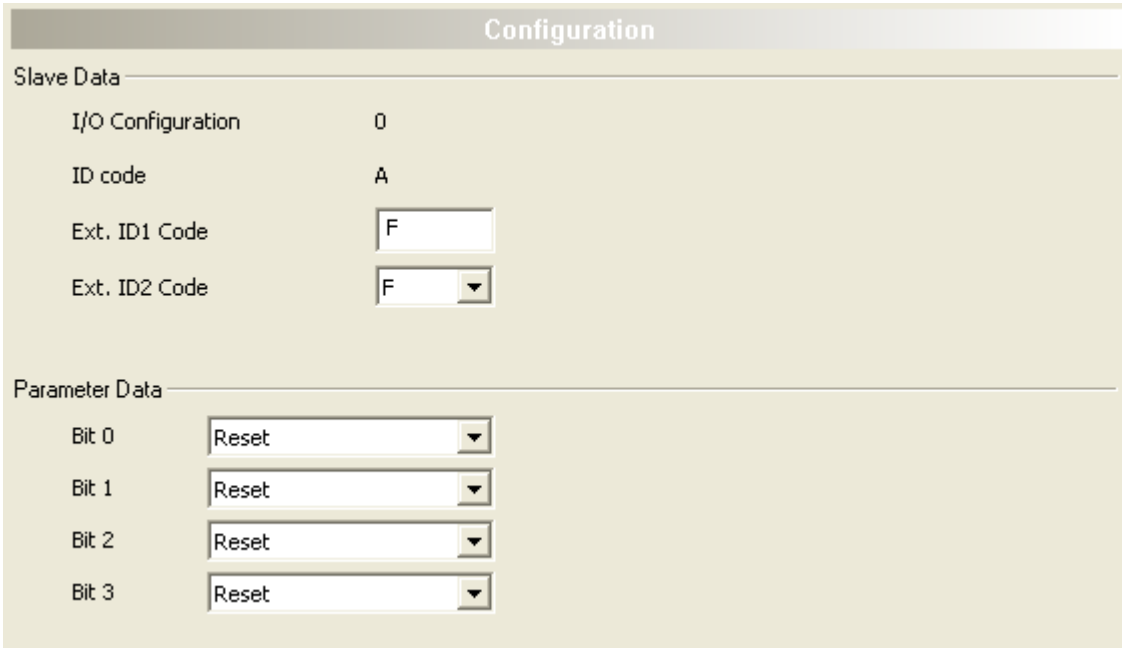

Figure 6: Configuration > Configuration

2. Configure the **Slave Data** and the **Parameter Data** as described in section *Configuring Slave Data* on page 21 or in section *Configuring Parameter Data* on page 22.

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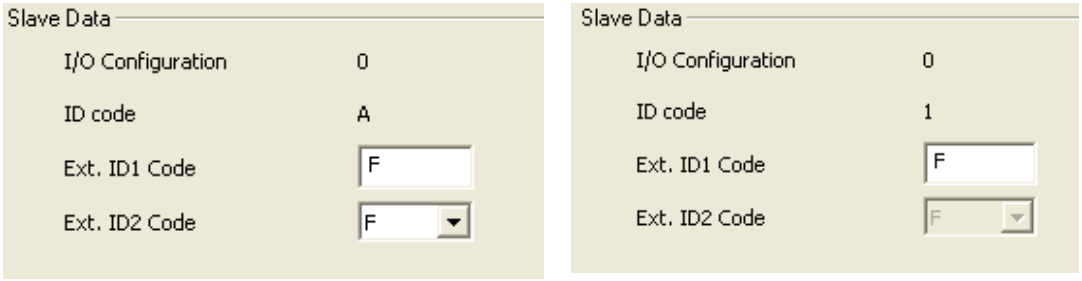
3.4.1 Configuring Slave Data

The **I/O Configuration** code, the **ID code** and the **Extended ID1 Code**/**Extended ID2 Code** (for devices that support **Extended ID2 Code**) correspond to the used “Slave profile” and must be set device specifically.



Profile S-7.3: Ext. ID2 code is supported

Profile S-0.1: Ext. ID2 code is not supported

Figure 7: Configuration > Configuration > Slave Data, Example Slave profiles, which support Ext. ID2 code or do not

Parameter	Meaning	Range of Value/ Value
Slave Data		
I/O Configuration	I/O Configuration as specified in the EDS file. The first digit of the slave profile is the I/O Configuration.	Default: depending on profile
ID Code	ID Code as specified in the EDS file. The second digit of the slave profile is the ID code. F. e. for profile S-7.A the default is A, for S-0.1 it is 1.	Default: depending on profile
Ext. ID1 Code	Extended ID1 Code: to set by the user	0 … F, Default: F
Ext. ID2 Code	Extended ID2 Code: to set by the user. Some devices (described with the corresponding “Slave profile”/EDS file) do not support Extended ID2 Code. So Ext. ID2 Code is disabled and the value is set to the default “F”.	0 … F, Default: F
safety query: **Current signal configuration will be lost. Proceed?**	Some profiles are changed, when changing the Ext. ID1 and/or Ext. ID2 codes. I. e., the signal configuration is modified as it is bound to the slave profile. Then the safety query **Current signal configuration will be lost. Proceed?** appears. Answer to it by **Yes** or **No**. **Yes**: Changes of the signal configuration are reset to the values of the last user modification. **No**: Changes of the signal configuration are not reset to the values of the last user modification.	Example profiles: query appears for S-7.A.8 when changing the Ext. ID1 code from 3 to 7, for S-7.3 when changing the Ext. ID2 code.
Error message: **Internal Error! Creating slave data model fails**	For the profiles S-7.A.8 and S-7.A.9 there are some combinations for ext. ID1 and ID2 codes that yield to a profile not specified by the AS-i protocol specification. In such cases, for example S-7.A.8 with ext. ID1 code 0, the Signal Configuration table disappears and the message provided by the AS-Interface Master is displayed that there is no such profile defined.	S-7.A.8, S-7.A.9 Example: S-7.A.8 with ext. ID1 code 0

Table 10: Explanations to the Dialog Pane Configuration > Slave Data

1. Under **Ext. ID1 Code** enter a value for the Extended ID1 Code.
2. If Ext. ID2 code is supported, select under **Ext. ID2 Code** a value for the Extended ID2 Code.

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3.4.2 Configuring Parameter Data

The **Parameter Data > Bit 0** to **Bit 3** can be set or reset.

The parameter data are vendor specific. The entries under **Parameter Data**/**Bit0 … Bit 3** come from the EDS file.

Please refer to the manual of the manufacturer to get further information to the parameter data.

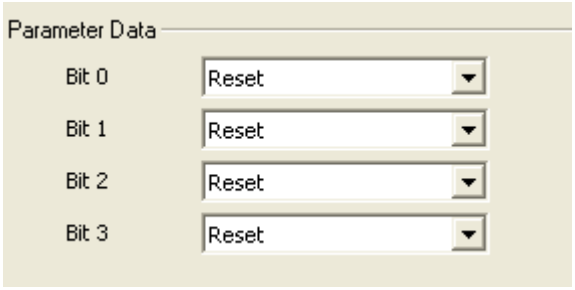

Figure 8: Configuration > Configuration > Parameter Data

Parameter	Meaning	Range of Value/ Value
Parameter Data		
Bit0 … Bit 3	Parameter Data Bit 1 to Bit 3: to be set by the user If no more information is set in the EDS file under **Parameter Data**/**Bit0 … Bit 3** the default Set/Reset is shown. If information for the **Parameter Data > Bit 0** to **Bit 3** is set in the EDS file, this information is shown.	Set/Reset Default: Set,/Reset

Table 11: Explanations to the Dialog Pane Configuration > Parameter Data

3. Under **Parameter Data**/**Bit0 … Bit 3** select an entry each.

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3.5 Signal Configuration

At the pane **Signal Configuration** for the single signals the names of the tags can be set or the data types configured.

Note: The configuration of the input/output signals of the Slave is specified by the used “Slave profile” described in the EDS file.

Proceed as follows:

1. Select Configuration > Signal Configuration in the navigation area.

➪ The dialog pane **Signal Configuration** is displayed.

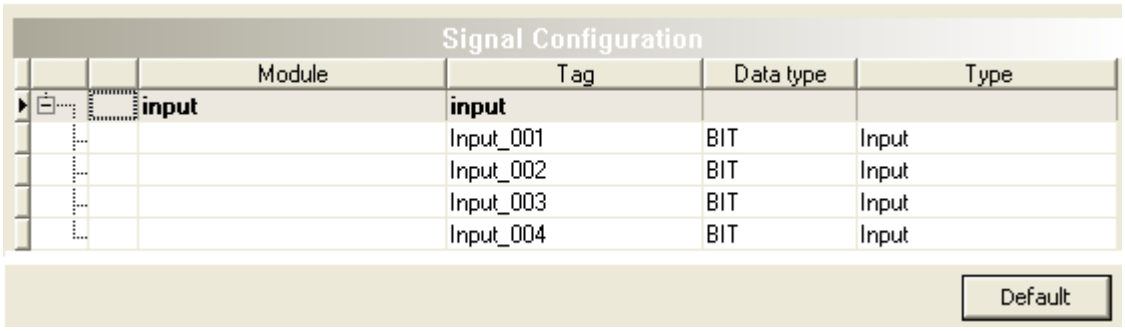

Figure 9: Configuration > Signal Configuration - Example

Parameter	Meaning	Range of Value/ Value
Module	Input or output module of the Signal Configuration	input, output
Tag	Tags for the single input or output signals. The name can be set by the user.	
Data type	Data type of the single input or output signals. Depending by the used AS-Interface Slave profile (EDS file) the user can select the data type from a list.	BIT, WORD, SIGNED16, UNSIGNED16, etc., Default: depends by EDS file used
Type	Type of the single input or output signals: input or output (not editable)	Input, Output
Default	Click **Default**, to set the signal configuration to the default values for the given slave profile. Answer to the safety query **Current signal configuration will be lost. Proceed?** by **Yes** or **No**. **Yes**: Changes of the signal configuration are reset to the default values. **No**: Changes of the signal configuration are not reset to the default values.	

Table 12: Explanations to the Dialog Pane Signal Configuration

2. In the column **Tag** respectively enter the names of the tags for the single signals.
3. In the column **Data type** respectively select the data types for the single signals.

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4 Device Description

4.1 About Device Description

Descriptions of "Device Description"

The table below gives an overview for the **Device Description** dialog panes descriptions:

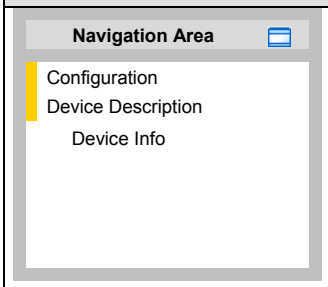
AS-Interface generic Slave DTM	Folder Name / Section	Page
 *Navigation Area - Description*	*Device Info*	*24*

Table 13: Descriptions of the Dialog Panes Device Description

4.2 Device Info

The **Device Info** dialog contains manufacturer information about the device, which is defined in the EDS file. The following information is indicated:

Parameter	Meaning
Vendor name	Vendor name of the device
Product name	Name of the device
Ident. number	Identification number of the device
Revision	Hardware reference
Icon file	File name of the device icon
Max input data length	Max input data length in Bit
Max output data length	Max output data length in Bit

Table 14: Explanations to the Dialog Pane Device Info

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5 Online Functions

5.1 Connecting/Disconnecting Device

Note: To access to the **diagnosis** panes and to use the diagnosis, requires an online connection from the generic AS-Interface Slave DTM to the AS-Interface Master DTM. This online connection can only be build up if a driver is assigned to the AS-Interface Master device.

For information on how to select a driver, to scan for a device and to select it in the Master DTM dialog, refer to the Operating Instruction Manual *DTM for AS-Interface Master devices*.

Connecting Device

The following steps are needed to establish a connection from the generic AS-Interface Slave DTM to the AS-Interface Master DTM:

1. In the Master DTM dialog select a driver and configure it, scan for the device and select it and select and download the firmware.
2. Close the user dialog of the AS-Interface Master DTM via the **OK** button.
3. Put a right-click on the device icon of the generic AS-Interface Slave.
4. Select the **Connect** command from the context menu (right mouse button).

↬ The generic AS-Interface Slave DTM now is connected to the AS-Interface Master DTM via an online connection. In the network view the device description at the device icon is displayed with a green colored background.

Disconnecting Device

The following steps are needed to disconnect an online connection from the generic AS-Interface Slave DTM to the AS-Interface Master DTM:

1. Close the user dialog of the generic AS-Interface Slave DTM via the **OK** button.
2. Right-click on the device icon of the generic AS-Interface Slave.
3. Select the **Disconnect** command from the context menu (right mouse button).

↬ The online connection from the generic AS-Interface Slave DTM to the AS-Interface Master DTM is disconnected. In the network view the device description is displayed not any more with a green colored background.

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6 Diagnosis

6.1 Overview Diagnosis

The dialog **Diagnosis** serves to diagnose the device behavior and communication errors. For diagnosis the device must reside in online state.

Diagnosis Panes

The table below gives an overview for the individual **Diagnosis** dialog panes descriptions:

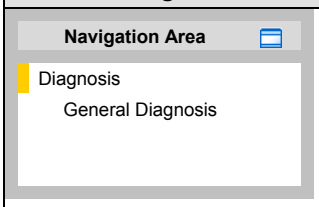
AS-Interface generic Slave DTM	Folder Name / Section	Manual Page
 *Navigation Area - Diagnosis*	*General Diagnosis*	*27*

Table 15: Descriptions of the Diagnosis Panes

Online Connection to the Master DTM

Note: Accessing the **Diagnosis** panes of the AS-Interface generic Slave DTM requires an online connection from the AS-Interface generic Slave DTM to the AS-Interface Master DTM. For further information refer to section *Connecting/Disconnecting Device* on page 25.

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6.2 General Diagnosis

The diagnosis indicates the Slave status as well as whether a peripheral fault has occurred. This is displayed in the **General Diagnosis** dialog.

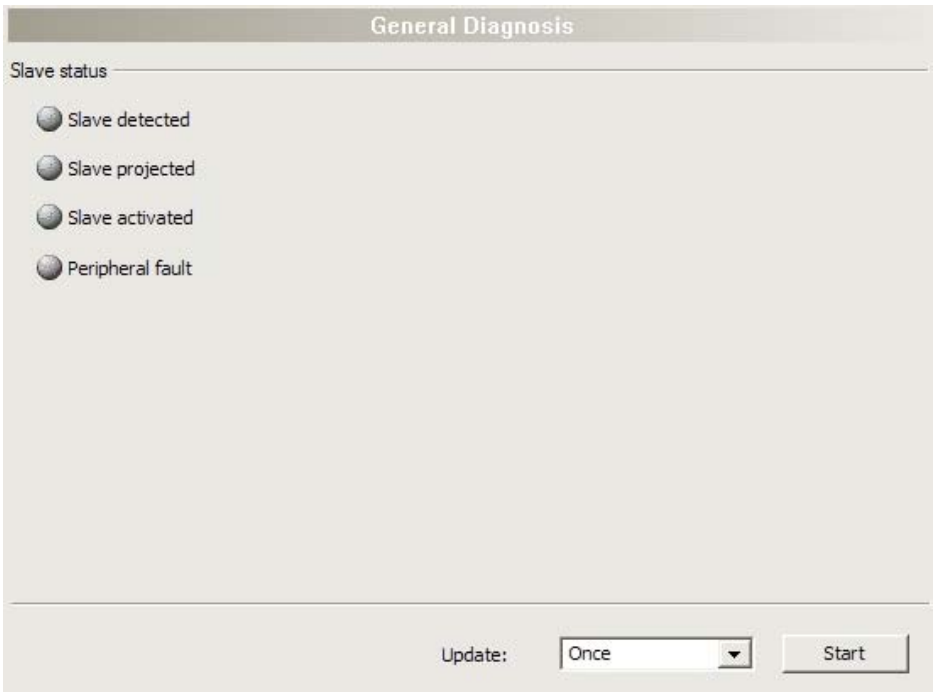

Figure 10: General Diagnosis

Indication	Meaning
Slave status	
Slave detected	When the “Slave detected” LED turns to green, the AS-Interface Slave has been detected by the Master (through the start up operation or inclusion phase). [2]
Slave projected	When the “Slave projected” LED turns to green, the AS-Interface Slave has been configured in the internal Master device list of projected Slave devices. [2]
Slave activated	When the “Slave activated” LED turns to green, the AS-Interface Slave has been activated during start up operation or inclusion phase. [2]
Peripheral fault	When the “Peripheral fault” LED turns to red, at the AS-Interface Slave a peripheral fault has been detected. [2]
Update	The diagnosis information can be updated “Once” or on “Cyclic” basis. Once — Select **Once** to update the information immediately, just once. Cyclic — Select **Cyclic** and **Start** to update the information cyclic. Then the information is updated about every 250 ms. Select **Stop** to stop the cyclic update.
Start (Stop)	Starts and stops updating the diagnostic info for cyclic update mode.

Table 16: Indication General Diagnosis

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7 Appendix

7.1 User Rights

User-rights are set within the FDT-container. Depending on the level the configuration is accessible by the user or read-only.

To access the **Configuration** and **Device Description** panes of the Generic AS-Interface Slave DTM you do not need special user rights. Also all users can select the decimal or hexadecimal Display mode or sort table entries.

Note: To edit, set or configure the parameters of the **Configuration** panes, you need user rights for *Maintenance,* for *Planning Engineer* or for *Administrator*.

The following tables give an overview of the user right groups and which user rights you need to configure the single parameters.

7.1.1 Configuration

	Observer	Operator	Maintenance	Planning Engineer	Administrator
General	D	D	X	X	X
Configuration	D	D	X	X	X
Signal Configuration	D	D	X	X	X

Table 17: Configuration (D = Displaying, X = Editing, Configuring)

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7.2 I/O Code, ID Code, ID2 Code and Slave Profiles

The **I/O Code** describes the direction of the data bits of a Slave. This can be: input, output, Bi-directional or Tristate.

The **ID Code** and **ID2 Code** are programmed by the production of a Slave and can not be changed by the user. They serve for the identification of the Slaves, which correspond to a fixed profile.

The identification of a Slave has to be done like the following:

S-[I/O-Code].[ID-Code].[ID2-Code].

I/O Code	**I/O Configuration**			
(4 Bit)	D0	D1	D2	D3
0x0	IN	IN	IN	IN
0x1	IN	IN	IN	OUT
0x2	IN	IN	IN	I/O
0x3	IN	IN	OUT	OUT
0x4	IN	IN	I/O	I/O
0x5	IN	OUT	OUT	OUT
0x6	IN	I/O	I/O	I/O
0x7	I/O	I/O	I/O	I/O
0x8	OUT	OUT	OUT	OUT
0x9	OUT	OUT	OUT	IN
0xA	OUT	OUT	OUT	I/O
0xB	OUT	OUT	IN	IN
0xC	OUT	OUT	I/O	I/O
0xD	OUT	IN	IN	IN
0xE	OUT	I/O	I/O	I/O
0xF	TRI	TRI	TRI	TRI

Table 18: Possible I/O Codes of a Slave

IN = Input data
OUT = Output data
I/O = In- and Output data
TRI = Tristate

For example the I/O Code 7 of a Slave:

If a Slave has this profile all four data bits can be read and written, they are bi-directional. For this profile various ID Codes are already defined.

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Slave Profile			ID Code													
			0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
I/O Code	0	I, I, I, I	-	0.1									A/B Slaves	0.B				Free Profiles
	1	I, I, I, O	-	1.1														
	2	I, I, I, B	-															
	3	I, I, O, O	-	3.1														
	4	I, I, B, B	-															
	5	I, O, O, O	X.0															
	6	I, B, B, B	-															
	7	B, B, B, B	-	7.1	7.2	7.3	7.4							7.B		7.D	7.E	
	8	O, O, O, O	-	8.1														
	9	O, O, O, I																
	A	O, O, O, B	X.0															
	B	O, O, I, I		B.1														
	C	O, O, B, B	X.0															
	D	O, B, B, B		D.1														
	E	O, B, B, B	X.0															
	F	T, T, T, T																

Table 19: Defined Slave profiles (released 01.03.2000)

I = Input data
O = Output data
B = In- and Output data
T = Tristate

The defined Slave profiles exist for:

I/O=X, ID=F	free profiles (X=O...E)
I/O=X, ID=0	remote I/O ports (X=0...E, not 9, B, D)
I/O=X, ID=A	reserved for A/B Slaves (X=0...E, not 2, A)
I/O=0, ID=1	two dual-signal sensors
I/O=0, ID=B	reserved for safety oriented sensors
I/O=1, ID=1	single sensor with extended control
I/O=3, ID=1	one dual-signal sensor, one dual actuator
I/O=3, ID=A	sensor with extended address function
I/O=7, ID=1	interface for the transfer of 6 to 18-bit signals
I/O=7, ID=2	extended Slave profile for the transmission of 6 to 21-bit signals
I/O=7, ID=3	extended Slave profile for the transmission of 16 bit signals
I/O=7, ID=4	extended Slave profile for the transmission of 16 bit signals to 4 bit digital values

Note: This table shows the defined Slave Profiles from the state 01.03.2000. Further extensions are possible.

The profile S-7.1 for example describes a device for the transmission of 6 to 18 bit signals (analog profile), the profile S-7.2 describes a device for the transmission of 6 to 21 bit signals (extended analog profile) and so on.

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7.3 I/O Data Size depending by IO and ID Code

The table *AS-Interface Slave Type* on page 32 contains an overview of the AS-Interface Slave profile types. The table shows the input or output data transmitted by the AS-Interface Slave devices depending by the IO or the ID Codes or the AS-Interface Slave profiles.

CCT Value

The CCT value (Combined Transaction Type) represents a general category to categorize the Slave profile types.

Transparent or analog I/O Data

In general transparent (mostly digital) or analog I/O data are distinguished. The data structure of the analog I/O data is defined in the AS-Interface specification. In spite of the data structure for the transparent I/O data is not defined there. Often the transparent data are digital values.

Please refer to the manufacturer manual of the device, to get more information on how the data structure of the transparent I/O data for the Slave device is defined.

Channel Size

Note: The AS-Interface specification defines for the I/O data a channel size of 16 Bit.
For CCT-2 profiles each the possible maximum value for the transmitted I/O data is configured.

CCT-2 Slave Profile

For devices configured via a CCT-2 profile, in the configuration software the maximum value for the transmitted I/O data is configured.

The I/O data displayed in the signal table correspond to this maximum value and do not show the size of the I/O data transmitted by the device.

Please refer to the manual of the Slave device manufacturer, to get the value of the size of the valid I/O data for the Slave device that are used or can be transmitted.

Default Value

The **default value for the analog input data** depends on whether analog or digital data are transmitted or changes depending from the Slave profile or the ID or ID2 code.

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7.3.1 AS-Interface Slave Types

AS-Interface Slave Profile Types								
CTT	**IO**	**ID Code**	**ID1**	**ID2**	**Input**	**Output**	**Note**	**Default values for analog input channels**
1	7	3	-	0		16 Bit (Transparent)	1 Channel 16 Bit	
1	7	3	-	1		32 Bit (Transparent)	2 Channel 16 Bit	
1	7	3	-	2		64 Bit (Transparent)	4 Channel 16 Bit	
1	7	3	-	4		16 Bit (Analog)	1 Channel 16 Bit	
1	7	3	-	5		32 Bit (Analog)	2 Channel 16 Bit	
1	7	3	-	6		64 Bit (Analog)	4 Channel 16 Bit	
1	7	3	-	8	16 Bit (Transparent)		1 Channel 16 Bit	0x0000
1	7	3	-	9	32 Bit (Transparent)		2 Channel 16 Bit	0x0000
1	7	3	-	A	64 Bit (Transparent)		4 Channel 16 Bit	0x0000
1	7	3	-	C	16 Bit (Analog)		1 Channel 16 Bit	0x7FFF
1	7	3	-	D	32 Bit (Analog)		2 Channel 16 Bit	0x7FFF
1	7	3	-	E	64 Bit (Analog)		4 Channel 16 Bit	0x7FFF
1	7	4	-	0	4 Bit	4 Bit	Transparent Digital In/Out	
1	7	4	-	4		16 Bit	1 Channel 16 Bit (analog or digital depend on	0x7FFF (0x0000)
1	7	4	-	5		32 Bit	2 Channel 16 Bit (analog or digital depend on	0x7FFF (0x0000)
1	7	4	-	6		64 Bit	4 Channel 16 Bit (analog or digital depend on	0x7FFF (0x0000)
1	7	4	-	C	16 Bit		1 Channel 16 Bit (analog or digital depend on	0x7FFF (0x0000)
1	7	4	-	D	32 Bit		2 Channel 16 Bit (analog or digital depend on	0x7FFF (0x0000)
1	7	4	-	E	64 Bit		4 Channel 16 Bit (analog or digital depend on	0x7FFF (0x0000)
1	7	4	-	F	64 Bit (input or output depend on ID string)		4 Channel 16 Bit (analog or digital depend on	0x7FFF (0x0000)
2	7	5	-	5	64 Bit + 2 Bit	64 Bit + 2 Bit	1 channel input and output, both up to 64(32) Bit (can be less). Dependent on "ID object"	0x7FFF (0x0000)
2	7	A	-	5	32 Bit + 2 Bit	32 Bit + 1Bit		0x7FFF (0x0000)
2	B	A	-	5	32 Bit	32 Bit		0x7FFF (0x0000)
3	7	A	7	7	4 Bit (Transparent)	4 Bit		
3	7	A	6	A	8 Bit (Transparent)	8 Bit	non consistent input (1Ch. 16Bit)	0x0000
3	7	A	7	A	8 Bit (Transparent)	8 Bit	consistent input (1Ch. 16Bit)	0x0000
4	7	A	3	8	8 Bit (Transparent)	1 Bit	1 Channel (left alignment 16Bit) +1Bit	0x0000
4	7	A	4	8	12 Bit (Transparent)	1 Bit	1 Channel (left alignment 16Bit) +1Bit	0x0000
4	7	A	5	8	16 Bit (Transparent)	1 Bit	1 Channel (left alignment 16Bit) +1Bit	0x0000

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AS-Interface Slave Profile Types								
CTT	**IO**	**ID Code**	**ID1**	**ID2**	**Input**	**Output**	**Note**	**Default values for analog input channels**
4	7	A	6	8	12 Bit (Analog)	1 Bit	1 Channel (left alignment 16Bit) +1Bit	0x7FFF
4	7	A	7	8	14 Bit (Analog)	1 Bit	1 Channel (left alignment 16Bit) +1Bit	0x7FFF
4	7	A	0	9	14 Bit (Analog)		1 Channel (left alignment 16Bit)	0x7FFF
4	7	A	1	9	12 Bit (Analog)		1 Channel (left alignment 16Bit)	0x7FFF
4	7	A	2	9	14 Bit (Analog)		1 Channel (left alignment 16Bit)	0x7FFF
4	7	A	3	9	14 Bit (Analog)		1 Channel (left alignment 16Bit)	0x7FFF
4	7	A	4	9	28 Bit (Analog)		2 Channel (left alignment 16Bit)	0x7FFF
4	7	A	5	9	28 Bit (Analog)		2 Channel (left alignment 16Bit)	0x7FFF
4	7	A	6	9	14 Bit (Analog)		2 Channel (left alignment 16Bit)	0x7FFF
4	7	A	7	9	28 Bit (Analog)		2 Channel (left alignment 16Bit)	0x7FFF
5	6	0	-	2	8 Bit (Transparent)	8 Bit (Transparent)	Allocate 2 Slave Address	0x0000
5	6	0	-	3	12 Bit (Transparent)	12 Bit (Transparent)	Allocate 3 Slave Address	0x0000
5	6	0	-	4	16 Bit (Transparent)	16 Bit (Transparent)	Allocate 4 Slave Address	0x0000
5	6	0	-	A	8 Bit (Analog)	8 Bit (Analog)	Allocate 2 Slave Address	0x7FFF
5	6	0	-	B	12 Bit (Analog)	12 Bit (Analog)	Allocate 3 Slave Address	0x7FFF
5	6	0	-	C	16 Bit (Analog)	16 Bit (Analog)	Allocate 4 Slave Address	0x7FFF

Table 20: AS-Interface Slave Types

Note: All CTT-Slave profile types contained in the table *AS-Interface Slave Type* are processed by the AS-Interface Master device[2]. All other Slave-profile types can not be classified as CTT-Slave-profile types and each have 4-bit input and 4-bit output data, as defined in the table *AS-Interface Slave Type* on page 30.

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7.3.2 Examples for I/O Data Size depending on Slave Profile

7.3.2.1 Profile S-7.3.2, 64 Bit Output Data (transparent)

7.	3.	2
/	I	\
IO-Code	ID-Code	ID2-Code

I/O Data: 64 Bit output (digital)

The signal configuration for the AS-Interface Slave profile „7.3.2“ shows:

- four transparent output modules of the data type „BIT“, e. g., 4 x 16 Bit output data (transparent).

Signal Configuration

Module	Tag	Data type	Type
output	**Output**		
	16-bit Output_001	BIT	Output
	16-bit Output_002	BIT	Output
	16-bit Output_003	BIT	Output
	16-bit Output_004	BIT	Output

Figure 11: Signal Configuration Example „S-7.3.2“

7.3.2.2 Profile S-7.3.5, 32 Bit Output Data (analog)

7.	3.	5
/	I	\
IO-Code	ID-Code	ID2-Code

I/O data: 32 Bit output (analog)

The signal configuration for the AS-Interface Slave profile „7.3.5“ shows:

- two analog output modules of the data type „WORD“, e. g., 2 x 16 Bit output data (analog).

Signal Configuration

Module	Tag	Data type	Type
output	**Output**		
	Output_001	WORD	Output
	Output_002	WORD	Output

Figure 12: Signal Configuration Example „S-7.3.5“

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7.3.2.3 Profile S-7.3.E, 64 Bit Input Data (analog)

7.	3.	E
/	I	\
IO-Code	ID-Code	ID2-Code

I/O data: 64 Bit input (analog)

Default for input data: 0x7FFF / 0x7FFF / 0x7FFF / 0x7FFF

The signal configuration for the AS-Interface Slave profile „7.3.E“ shows:

- four analog input modules of the data type „WORD“, e. g., 4 x 16 Bit input data (analog).

Signal Configuration

Module	Tag	Data type	Type
input	**Input**		
	Input_001	WORD	Input
	Input_002	WORD	Input
	Input_003	WORD	Input
	Input_004	WORD	Input

Figure 13: Signal Configuration Example „S-7.3.E“

7.3.2.4 CCT-2 Profile S-7.5.5, 64 Bit+2 Bit Input- and 64 Bit+2 Bit Output Data (analog or transparent and digital)

7.	5.	5
/	I	\
IO-Code	ID-Code	ID2-Code

I/O data: 64 Bit input (analog or transparent) + 2 Bit input (digital) and 64 Bit output (analog or transparent) + 2 Bit output (digital)

The default data depend on the device. For the default data refer to the respective manual of the Slave device manufacturer.

Note: Regardless of the information in the manual, in case of device failure or protocol error in the input image of the process data the value "0x7FFF" can be displayed. The process data image can be viewed in the AS-Interface Master DTM.

The signal configuration for the AS-Interface Slave profile „7.5.5“ shows:

- one analog input module of the data type „WORD“, e. g., 64 (=4 x 16) Bit input data (analog or transparent),
- one digital input module of the data type „Bit“, e. g., 2 Bit input data (digital),
- one analog output module of the data type „WORD“, e. g., 64 (=4 x 16) Bit output data (analog or transparent),
- one digital output module of the data type „Bit“, e. g., 2 Bit output data (digital).

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Signal Configuration

Module	Tag	Data type	Type
input	**Analog Input**		
	Input_000	WORD	Input
	Input_001	WORD	Input
	Input_002	WORD	Input
	Input_003	WORD	Input
input	**Digital Input**		
	Input_004	BIT	Input
	Input_005	BIT	Input
output	**Analog Output**		
	Output_000	WORD	Output
	Output_001	WORD	Output
	Output_002	WORD	Output
	Output_003	WORD	Output
output	**Digital Output**		
	Output_004	BIT	Output
	Output_005	BIT	Output

Figure 14: Signal Configuration Example „S-7.5.5“

The number, size or assignment of the relevant I/O data depends on the IO object and is specified in the manual of the Slave device manufacturer. Please refer to the manual of the Slave device manufacturer, to get the value of the size of the valid I/O data for the Slave device that are used or can be transmitted.

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7.3.2.5 CCT-2 Profile S-7.A.5, 32 Bit+2 Bit Input- and 32 Bit+1 Bit Output Data (analog or transparent and digital)

7.	A.	5
/	I	\
IO-Code	ID-Code	ID2-Code

I/O data: 32 Bit input (analog or transparent) + 2 Bit input (digital) and 32 Bit output (analog or transparent) + 1 Bit output (digital)

The default data depend on the device. For the default data refer to the respective manual of the Slave device manufacturer.

Note: Regardless of the information in the manual, in case of device failure or protocol error in the input image of the process data the value "0x7FFF" can be displayed. The process data image can be viewed in the AS-Interface Master DTM.

The signal configuration for the AS-Interface Slave profile „7.A.5“ shows:

- one analog input module of the data type „WORD“, e. g., 32 (=2 x 16) Bit Input Data (analog or transparent),
- one digital input module of the data type „Bit“, e. g., 2 Bit Input Data (digital),
- one analog output module of the data type „WORD“, e. g., 32 (=2 x 16) Bit Output Data (analog or transparent),
- one digital output module of the data type „Bit“, e. g., 1 Bit Output Data (digital).

Signal Configuration

Module	Tag	Data type	Type
input	**Analog Input**		
	Input_001	WORD	Input
	Input_002	WORD	Input
input	**Digital Input**		
	Input_003	BIT	Input
	Input_004	BIT	Input
output	**Analog Output**		
	Output_001	WORD	Output
	Output_002	WORD	Output
output	**Digital Output**		
	Output_003	BIT	Output

Figure 15: Signal Configuration Example „S-7.A.5“

The number, size or assignment of the relevant I/O data depends on the IO object and is specified in the manual of the Slave device manufacturer. Please refer to the manual of the Slave device manufacturer, to get the value of the size of the valid I/O data for the Slave device that are used or can be transmitted.

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7.3.2.6 CCT-2 Profile S-B.A.5, 32 Bit Input- or 32 Bit Output Data (digital)

B.	A.	5
/	I	\
IO-Code	ID-Code	ID2-Code

I/O Data: 32 Bit input (digital) and 32 Bit output (digital)

The default data depend on the device. For the default data refer to the respective manual of the Slave device manufacturer.

Note: Regardless of the information in the manual, in case of device failure or protocol error in the input image of the process data the value "0x7FFF" can be displayed. The process data image can be viewed in the AS-Interface Master DTM.

The signal configuration for the AS-Interface Slave profile „B.A.5“ shows:

- one digital input module of the data type „BIT“, e. g., 32 Bit Input Data (digital),
- one digital output module of the data type „BIT“, e. g., 32 Bit Output Data (digital).

Signal Configuration

Module	Tag	Data type	Type
input	**Digital Input**		
	32-bit Input	BIT	Input
output	**Digital Output**		
	32-bit Output	BIT	Output

Figure 16: Signal Configuration Example „S-B.A.5“

The number, size or assignment of the relevant I/O data depends on the IO object and is specified in the manual of the Slave device manufacturer. Please refer to the manual of the Slave device manufacturer, to get the value of the size of the valid I/O data for the Slave device that are used or can be transmitted.

7.4 References

[1] Device Type Manager (DTM) Style Guide, Version 1.0 ; FDT-JIG - Order No. <0001-0008-000>

[2] Complete Specification of the Actuator-Sensor-Interface, presently Version 3, Revision 2, dated July 9, 2008

[3] Profiles (Annex A and B to the Complete AS-Interface Specification) of the Actuator-Sensor-Interface, presently Version 3, Revision 2, dated July 9, 2008

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7.7 Glossary

CTT

Combined Transaction Type (AS-Interface Slave-profile types, which differ at the protocol level.)

DTM

Device Type Manager

The Device Type Manager (DTM) is a software module with graphical user interface for the configuration and/or for diagnosis of devices.

EDS

An Electronic Data Sheet (EDS) provides information necessary to access and alter the configurable parameters of a device. An Electronic Data Sheet (EDS) is an external file that contains information about configurable attributes for the device – extended ID1, ID2 (if supported) codes and parameter data description.

FDT

Field Device Tool

FDT specifies an interface, in order to be able to use DTM (Device Type Manager) in different applications of different manufacturers.

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